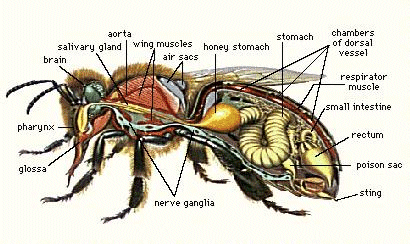
Life Cycle:

There are three types of honey bees: queens, which produce eggs, drones (males) who copulate with the queen, and workers (non reproductive females). Once impregnated, the queen lays eggs, one at a time, in each comb of the hive. The larvae hatch three to four days later and are fed by worker bees. During this time they undergo a number of instar phases and eventually eclose from the pupal case. Timing is dependent on what kind of bee is developing. The queen lays both fertilized and unfertilized eggs. Unfertilized eggs develop into drones while fertilized eggs develop into either workers or queens. There is typically only 1 queen per hive, with the exception of large hives. In order for a queen to develop she must be fed royal jelly by the worker bees. She is kept in her comb until the present queen dies.

Anatomy and Physiology





Bees are a fairly typical insect. They have three main body parts: a head, thorax and abdomen and three pairs of legs. On their head they have a proboscis, antennae and two compound eyes and three simple eyes. They also have two pairs of wings, one pair of forewings and one pair of hind wings. One noticeable difference from many other insects is their stinger. Bees do not have bones like vertebrates but rather a tough exoskeleton made from chitin and covered with layers of wax, which aids in water retention. Like most insects it has an open circulatory which bathes organs in hemolymph. Breathing is accomplished because of small air sacs which allow air to be drawn into the body through holes in the exoskeleton known as spiracles. The bee has a brain and nerve ganglia running the length of the body on the ventral side. It has a one way digestive tract that includes a regular stomach and a honey stomach. Finally the bee also has a poison sac which is attached to the stinger. When a bee stings poison is secreted into the canal and into the stinger.

|  |  |
| --- | --- |
| **The Antennae**  Antennae in insects come in a variety of shapes and sizes. Bumble bees and honey bees have what are called **elbowed antennae**, which bend at a joint in the middle, as would a human arm. | http://beespotter.mste.uiuc.edu/topics/mimics/images/antenna.jpg |
| **The Wings**  Most insects have two pairs of wings, and this includes all bees. This is an important feature to recognize; many flies are disguised as bees, but flies only have one pair of wings. | http://beespotter.mste.uiuc.edu/topics/mimics/images/wings.jpg |
| **The Body**  The body of a bumble bee or honey bee is covered in thick hair, making them appear quite fuzzy. This can be a useful way to tell between bees and wasps. | http://beespotter.mste.uiuc.edu/topics/mimics/images/body.jpg |
| **The Mouthparts**  Bees have a unique type of mouth that has the usual insect mandibles (jaws), but also a long tongue. These mouthparts can be difficult to see unless the bee is stationary and feeding, but it is an important difference between bees and all other insects. | http://beespotter.mste.uiuc.edu/topics/mimics/images/mouth.jpg |
| **The Legs**  The hind legs of the honey bee and bumble bee hold the most important difference between these and all other kinds of Illinois bees. Look to the image at the right, and at the enlarged section indicated by the arrows. This is the pollen basket, a hairy, concave (spoon like) section of the leg where the bees pack pollen they collect from flowers. A few other tropical bees have this leg, but in Illinois, you will only see it on bumble bees and honey bees. Keep in mind that the other enlarged section, below the pollen basket, may be present on other bees. Additionally, male bees do not have pollen baskets, so you must use other features to identify them. | http://beespotter.mste.uiuc.edu/topics/mimics/images/legs.jpg http://beespotter.mste.uiuc.edu/topics/mimics/images/nolegs.jpg |

-Beespotter online

**Mimicry**

Mimicry is a natural phenomenon which involves one animal developing the similar characteristics of another more dangerous animal over evolutionary time. This phenomenon is advantageous to the mimic (the one mimicking) because it increases the animal’s survival rate. There are two types of mimicry: Batesian and Mullerian. Batesian mimicry involves a harmless mimic looking like a dangerous model whereas Mullerian mimicry ivolves an already dangerous mimic looking like another dangerous model. Mimics exist all through the animal kingdom but are most prevalent in insects.

Activity

Using the categories listed in figure 1 below, discern which insect is the honeybee and which is the mimic in the pictures below. Use the table to show which characteristics they share and which are different.

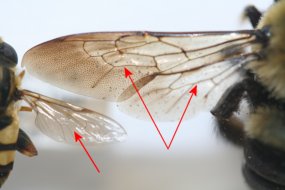
|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Antennae  http://beespotter.mste.uiuc.edu/topics/mimics/images/Gantenna.gif | Wings  http://beespotter.mste.uiuc.edu/topics/mimics/images/Gwing.gif | Mouthparts  http://beespotter.mste.uiuc.edu/topics/mimics/images/Gmouth.gif | Legs  http://beespotter.mste.uiuc.edu/topics/mimics/images/Gleg.gif | Hairy Body  http://beespotter.mste.uiuc.edu/topics/mimics/images/Gbody.gif |

Figure 1: Characteristics of honeybees.



(wasp vs honeybee)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Shared |  |  |  |  |
| Unshared |  |  |  |  |

(drone fly and honeybee)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Shared |  |  |  |  |
| Unshared |  |  |  |  |

(Honey bee on left, bumblebee on right)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Shared |  |  |  |  |
| Unshared |  |  |  |  |